



Aerosol Fog System for Fixing Radioactive Contamination

The Challenge

Many subsurface/pit facilities associated with Hanford's tank farms (e.g., pump-pits, lift stations, and transfer stations) contain fixed, removable, and potentially-airborne radioactive contamination. This contamination has resulted from past leaks from waste transfer piping, jumpers, ventilation ducting and other pathways. Personal protective equipment, tent enclosures and other preventative measures are routinely used during equipment maintenance/upgrade activities in these facilities to protect the workers and the environment. Although very necessary, such preventative measures are time consuming, costly and can present additional risk to workers. Continuous improvements for worker and environmental protection per ALARA (As Low As Reasonably Achievable) principles are encouraged whenever possible.

Current Approach

The standard approach for minimizing airborne release of contamination during field activities in the pit facilities involves flushing the pits with a water spray prior to entry, followed by frequent decontamination (i.e., damp-rag wipe down) of the containment tent walls. Both the water flushing and decontamination efforts generate secondary waste. This hands-on decontamination approach has several downsides: 1) workers receive some radiation exposure, 2) workers must spend additional time wearing personal protective equipment, 3) workers are prone to heat stress in the protective equipment and must be closely monitored for heat stress.

Even though work on highly contaminated equipment in outdoor areas is not permitted when expected wind velocities exceed a predetermined limit, unexpected wind gusts do occur. For example, while performing work in the 244-A Lift Station in September 1996, a whirlwind lifted contamination out of



An aerosol fog system applies a sticky coating capture over tank-farm work site. The "coating capture" fixes the radioactive contaminants so that workers can enter the area and perform routine maintenance and upgrade activities under enhanced ALARA conditions.

Benefits and Features

The aerosol fog system offers

- comprehensive coverage for maximum coating capture
- remote, in-situ application that reduces human exposure and enhances worker safety
- improvement in worker protection per ALARA principles
- reduced time, effort and cost required for preventative radiation-protection
- minimized immediate decontamination activity required
- 25% reduction in secondary waste
- effective capture protection that lasts for many weeks.

an open tent containment and spread it over three acres of land. Workers spent three weeks on multiple shifts cleaning up the contamination area. This event prompted improvements to the baseline approach.

New Technology

An aerosol fog system is now used at Hanford to apply a "capture coating" that fixes radioactive contamination in tank farm pit facilities prior to worker entry. The capture coating is a sticky proprietary blend of monosaccharides and polysaccharides (sugar and starch compounds) applied as an aerosol fog and spray. The aerosol is applied in a slow-flowing and non-disturbing manner (i.e., less than 10 cfm). The aerosol constituent initially acts as a gas, then "condenses" to cover all exposed surfaces with a viscous, tacky coating. This aerosol fogging approach allows the capture of various contaminants *in-situ* without human exposure.

While this technology was originally intended to serve as a tool in the cleanup of ductwork, piping, hoods, and glove boxes contaminated with plutonium, the East Tank Farm Radiological Controls organization recently promoted its use in Hanford's tank farm facilities. For applications at the 244-A Lift Station, the fog is applied through access ports in the concrete cover-blocks prior to entry. The capture coating covers all surfaces including pit walls, floors, cover blocks, jumpers and other ancillary equipment. The portable equipment includes a control station (400 pounds, 4x3x2 feet) and as much flexible ducting as needed to reach the work area.

The fog technology maximizes ALARA principles since the capture coating can be remotely applied to inaccessible areas (e.g., pump pits, piping and equipment internals, and ventilation ducting) or to rooms where human entry should be minimized. It is estimated that worker exposure and secondary waste generation are reduced by more than 25 percent as a result of minimizing or eliminating time required to perform intermediate decontamination efforts (e.g., constantly wiping down walls of containment tents). Furthermore, unlike water sprays, the capture coating remains effective for many weeks after application.

To date, a number of tank farm facilities have been treated with the capture coating system at a direct cost of \$3,000 per application. This cost figure reflects use of the technology on a short-notice basis. Under a more extended service contract arrangement, costs could be significantly reduced as use rate is increased. These costs compare favorably against the clean-up cost associated with a potential release to the surrounding soil surface. The reduction in time required for decontamination efforts also results in increased productivity.

In November 1996, the aerosol fogging system was first demonstrated in the 244-A Lift Station at the expense of the provider (Encapsulation Technologies). The overall performance of the application was extremely effective. Since then, Encapsulation Technologies has been hired on an "on-call" basis for applications to subsequent pit projects in both 200-East and West tank farm facilities.

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URL: <http://www.hanford.gov/techmgmt/factsheets/deploy/fogger.htm>

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